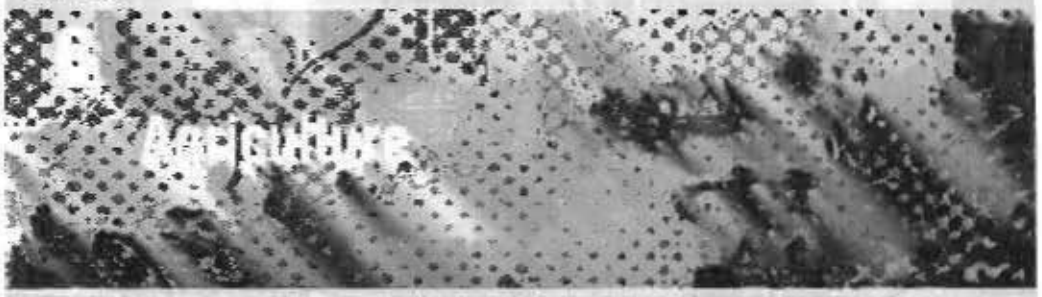
CHAPTER



Agriculture

Tracy Dennison and James Simpson

Contents

Agriculture and long-run growth 148
Technological change and the growth of productivity and population 151
Urbanization, markets, and farm specialization 156
Institutions 159
Conclusion 162

Agriculture and long-run growth

In 1700, all economies were based very largely on agricultural production. The agricultural sector employed most of the workforce, consumed most of the capital inputs and provided most of the outputs in the economy. In some ways this is obvious. People in 1700 were much poorer than they are today but required similar levels of food intake, so food must have constituted a higher percentage of economic activity – whether measured from the production, consumption, or expenditure side of the national income identity. Hence at the onset of the Industrial Revolution in England , around 1770, food accounted for approximately 60 percent of the household budget, compared with just 10 percent in 2001 (Feinstein, 1998). But it is important to realise that agriculture additionally provided most of the raw materials for industrial production: fibres for cloth, animal skins for leather, and wood for building houses and ships and making the charcoal used in metal smelting. There was scarcely an economic activity that was not ultimately dependent on agricultural production – even down to the quill pens and ink used by clerks in the service industries.

The very large share of agriculture in economic activity has several important economic implications. First, the growth rates of agricultural output and productivity within each country were the primary determinants of overall growth rates in each country. Similarly, agricultural productivity differentials across countries were the primary determinants of overall productivity differentials across countries. Second, Crafts (1985a) has emphasized that substantial food imports were unavailable to any country in the eighteenth century because no country was producing a sufficient agricultural surplus to be able to supply the food demanded by another. Therefore any transfer of labor resources from agriculture to industry required high output per worker in domestic agriculture, because each agricultural worker had to produce enough to feed both himself and some fraction of an industrial worker. This is crucial, because the transfer of labor resources out of agriculture and into industry has come to be seen as the defining feature of early industrialization. Alternative paradigms of industrial revolution – such as significant increases in the rate of productivity growth, or a marked superiority of industrial productivity over that of agriculture – have not been supported by the empirical evidence.

Measuring the importance of the agricultural sector in each economy in 1700 and tracing its evolution over time with any degree of precision are impossible. The standard modern approach would be to calculate for each year the share of agriculture in GDP in each country. By contrast, the best that we can do is to estimate the percentage of the workforce employed in agriculture for a selection of countries at benchmark dates. Nonetheless, this proves to be quite a useful statistic if we follow the Crafts definition of industrialization. Brunt and Fidalgo

Table 6.1 The percentage of the European workforce employed in agriculture

	1705	1775	1845	1870
Austria	n.a.	75	72	64
Belgium	n.a.		26	17
Denmark	n.a.	n.a.	n.a.	45
England	35	29	20	14
France	70	65	59	59
Ionia	n.a.	n.a.	68	60
Ireland	48	48	75	49
Malta	n.a.	n.a.	50	50
Netherlands	n.a.	38	34	35
Norway	n.a.	n.a.	33	33
Poland	n.a.	n.a.	89	58
Prussia	80	70	60	49
Russia	n.a.	n.a.	81	81
Scotland	n.a.	50	23	17
Spain	71	66	61	61
Sweden	n.a.	n.a.	n.a.	80
Wales	n.a.	n.a.	n.a.	53

Source: Brunt and Fidalgo, 2008.

(2008) recently reexamined the available data on the European agricultural workforce and we report their findings in Table 6.1.

We can see that the relative importance of agriculture declined fastest in England, Scotland, and Belgium, with the Netherlands being some way behind. Norway was also low, but this is almost certainly due to the extraordinary importance of fishing in GDP, rather than a sign of early industrialization. Most other European economies remained predominantly agricultural through to 1870.

Measuring agricultural productivity in this period is very difficult owing to the severe data constraints. The data on labor and land inputs are poor; but the data on capital inputs are non-existent, which precludes any attempt to estimate total factor productivity. The data on arable agriculture are considerably better than the data on pastoral agriculture. This is partly because arable agriculture is immobile and tends to be taxed, whereas pastoral agriculture can be highly mobile and is therefore seldom or ineffectually taxed. But, also, there is a clear distinction in arable agriculture between inputs (such as seed and fertilizer) and outputs (such as grain and straw). By contrast, in pastoral agriculture an animal can be either an input (such as a breeding cow that gives milk and calves) or an output (such as a cow that is sent to the slaughter house for meat and leather); tax and census data on animals almost never distinguish between these different possibilities.

Table 6.2 European agricultural labor productivity (England = 100 in 1800)

	1600	1700	1750	1800
England	53.1	80.4	107.7	100.0
Belgium	88.1	83.9	85.3	77.6
Netherlands	74.1	86.7	103.5	100.7
France	50.3	51.7	55.9	58.0
Italy	58.0	56.6	49.0	39.9
Spain	53.1	60.8	55.9	49.0
Germany	39.9	37.8	39.2	46.9
Austria	39.9	51.7	69.9	51.5
Poland	54.5	65.7	65.0	74.8

Source: Derived from Allen, 2000, p. 20.

An alternative procedure is to derive agricultural output from the demand side. The crudest procedure is to assume constant consumption per head. However, economists have long established that the demand for food varies with income and relative prices. Using abundant historical data on wages and prices, together with standard assumptions concerning the price and income elasticities of demand, Allen (2000) derives the demand for food for a number of European economies for the period 1300–1800. Making allowances for known imports and exports of food then provides estimates of agricultural output. Dividing agricultural output by the agricultural labor force yields the results reported in Table 6.2.

We can see that England, Belgium, and the Netherlands were far more productive than other countries. This fits broadly with the emerging literature that stresses the divergence between northwestern Europe and the rest of the continent during the early modern period. This pattern of comparative productivity can also be seen in the later nineteenth century, when better quality data become available, based on direct observation of outputs. The data for 1890 in Table 6.3 show a very similar pattern of comparative productivity within Europe, with output per worker substantially higher in the northwest than in the rest of the continent.

There are a number of well-known and important difficulties in using labor productivity as an indicator. One problem is that we are measuring annual labor productivity as total output divided by all workers, rather than productivity per hour worked, and there could be systematic differences across countries in workforce utilization. For example, agricultural labor in traditional societies often had several sources of employment and these could include alternative sectors such as services (especially transport), construction, mining, or industry. Also, workers could be seasonally unemployed; their earnings

Table 6.3 European agricultural labor productivity in 1890 (United Kingdom = 100)

	1890
United Kingdom	100
Netherlands	82
Denmark	44
France	52
Italy	28
Spain	33
Germany	63

Source: O'Brien and Prados de la Escosura, 1992, p. 531.

might be enough to keep them living in the countryside year-round but there was not enough work to keep them occupied in the slack periods. This distinction was perhaps less important in a country such as England, where in 1700 the agricultural workforce consisted of family labor supplemented by young adults hired on annual contracts (Allen, 1994, p. 106). But it was important on the large Italian and Spanish *latifundios*, where the highly seasonal demand for labor led to temporary contracts and farm employment for the landless that was perhaps half that of those in northern Europe. The problem for much of southern and eastern Europe was the lack of year-round employment opportunities in agriculture.

However, if we take the above estimates as broadly representative then we need to consider just why labor productivity and rural living standards differed so markedly across Europe. This requires us to explain both why productivity and farmers' living standards failed to rise over much of eastern and southern Europe, and why labor productivity surged ahead in some areas of northwest Europe. Successive sections below look at technological change and population growth, urban markets and specialization, and institutional factors. We conclude with some general comments on the contribution of the agricultural sector to industrialization.

Technological change and the growth of productivity and population

The significant increase in Europe's population over the period 1700 to 1870, described in Chapter 2 of this volume, required an increase in food output if living standards were not to decline. Much of the European continent had long been settled, hence changes in the size of the population equate largely to changes in the density of population, rather than expansion at the geographical

frontier as in North America or Australia. Much, though not all, of the increase in output between 1700 and 1870 is attributable to an increase in the intensity of rotations and the switch to new crops. In exceptional cases this could involve the planting and production of a high-value crop, such as grapes in the Médoc, but usually it involved much humbler ones such as the potato, which was high in calories and low in cost.

The Malthusian model of population notes that rising population makes land increasingly (relatively) scarce. We would expect this to prompt the adoption of land-saving techniques and result in a reduction in output per worker, since each worker has less land to cultivate. At first glance, the European evidence is consistent with this interpretation. For example, land was in limited supply in the Netherlands. Therefore, as the economy and population boomed in the seventeenth century as a result of the Dutch monopoly of the spice trade to Asia, it made sense to respond by both creating new land and intensifying production on existing land to meet the urban demand for food. This prompted both the reclamation of land from the sea using dykes, and the application of much more fertilizer to each unit of land. A comparable change in England in the eighteenth century was the replacement of fallow land by crops such as turnips and clover, thus making more intensive use of land resources and effectively increasing the area of cultivated land per worker. This technique reached its apogee in England in the mid-nineteenth century with the widespread adoption of the "Norfolk four-course" crop rotation, in which wheat cultivation in one year was followed by turnips in the next year, barley in the next, and clover in the next. This system was adopted in the nineteenth century in modified form in other northern European countries. In the English system the turnips and clover were fed to animals, which raised meat output for the voracious English market. In France and parts of central Europe the turnips were substituted with sugar beet; this made sense because the farmers faced a lower demand for meat (since incomes were lower and meat is an income-elastic good) and sugar was more expensive (since countries such as Germany did not have tropical colonies which could produce cheap cane sugar). Attempts were made around the Mediterranean to introduce the new rotations of northern Europe, but they usually failed because of the very different farming and market conditions found there.

Yet southern farmers were not necessarily disadvantaged in the same way as their northern counterparts when it came to rising population pressure. One of the problems of southern Europe was the periodic unemployment that occurred through the year, and intensification of production could help to solve this problem. First, in some areas the land, which had once provided only poor-quality natural grazing, was plowed up and cereals sown instead. Second, cereal rotations, which had provided just a single harvest every three or more

years, were shortened so that crops were taken more frequently. Finally, the area under crops such as vines and olives increased. While a hectare of cereals in southern Spain in the 1880s provided only about 20 days' employment per year (less if fallow is taken into consideration), the vine required 80 days and the olive 30 days (Simpson, 1995). Contemporaries in Spain at this time considered that their natural resource endowment was favorable, and cereal producers in the 1850s and winegrowers in the 1870s looked to become major exporters. Their hopes were ruined only as the integration of global food markets led to New World countries capturing these export markets and then threatening Spain's domestic markets themselves. The situation was similar elsewhere in the Mediterranean. Tariffs were significantly increased on cereals in Spain in 1891, just as they were in France (1885–94), Italy (1887–94), and Portugal (1889–99). Spanish contemporaries came to reflect bitterly on what were then perceived as their country's poor natural resource endowments. In effect, the integration of the North Atlantic grain and livestock economy had shifted the comparative advantage of large areas of the Mediterranean from land-intensive agriculture to capital-intensive agriculture. The difficulties for farmers to adapt to this change were considerable, and the final stage in the process of crop intensification only came with modern irrigation, which required both the construction of large-scale reservoirs to store the water (as opposed to simply using free-flowing rivers and streams) and the development of biotechnologies to create new specialist crops to sell in national and international markets. Certainly there were some signs of change in the Mediterranean as early as 1870, but the process only acquired any real importance from the mid-twentieth century.

In eastern Europe, too, especially in the areas still dominated by serfdom, the introduction of new agricultural technologies occurred more slowly and unevenly than in the northwest. There were some entrepreneurial landlords who introduced new rotations and crops on their demesne lands. For example, in the mid-eighteenth century the Kleist family initiated a move from the traditional three-field grain system to a system of fallow-free convertible farming, which resulted in a substantial increase in output (Hagen, 2002, pp. 314–15). Further east, demand grew among more enterprising Russian landlords for English books on agricultural improvements.[1] There were even instances of Russian peasants themselves introducing modifications such as new fertilizers and non-grain crops on their own allotments (Moon, 1999, pp. 130–31). On the whole, however, the three-field system of grain cultivation (mainly wheat, rye,

[1] Konstantin Levin, the enthusiastic reformer in Tolstoy's *Anna Karenina*, was modelled on such a landlord. It is worth noting that in the end Levin abandons his reforms, having decided that English innovations were impossible in a Russian context.

and oats) remained in place throughout eastern Europe until well into the nineteenth century (in much of Russia it remained in place even after the abolition of serfdom in 1861). This was to some extent due to the different ecological conditions in this region (shorter growing seasons, different soils) and, in the case of the Russian empire, to an abundance of land, which reduced the pressure to intensify production. But even more important in central and eastern Europe were the institutional constraints imposed by serfdom and strong rural communities, about which more will be said later.

One example of crop intensification which achieved widespread success was the introduction of the potato. Although it had been known since the sixteenth century, when it had been brought by the Spanish from its native habitat in the Peruvian and Bolivian Andes, the potato was rarely grown in Europe before the late eighteenth century. Then a combination of growing population pressure, grain shortages, and famine, together with the development of new seed varieties, encouraged its spread – in the early 1770s to parts of Switzerland, Germany, and Austria, in the 1790s to France, and in the 1810s to Hungary and Poland (Blum, 1978, pp. 271–76). While France had about 20,000 hectares planted on the eve of the Revolution, the figure had risen to 3 million by the first decade of the nineteenth century. The potato provided many more calories per hectare than wheat or rye (but not necessarily in terms of hours worked), and allowed many small farmers to subsist, freeing them to use the rest of their land and labor to grow cash crops. Yet there were limits on an agricultural system excessively dependent on the potato, as it was both difficult to store and transport, which made it difficult for growers to accumulate savings as an insurance against crop failure (Mokyr, 1985).

Technological change could provide a way for the population to grow while simultaneously improving labor productivity and living standards. According to Boserup (1965), technological change occurs as a direct result of population pressure, as it is the increasing difficulty in meeting the current standard of living that spurs people to innovate. One could argue that the development of European agriculture fits this characterization, especially the increasing population pressure in the northwest and the response of increasing capitalization and the introduction of new crops to use land resources more intensively. But there are two caveats to this straightforward and attractive line of reasoning.

First, it is usual to draw a distinction between "technological change" and the "choice of technique." The former is a dynamic concept: new technology is created in response to high or rising input prices. The latter is a static concept: farmers are already aware of a range of possible production techniques and they choose the least-cost method of production given the prices that they face. Many of the fertilization techniques (such as liming and marling) that came into fashion in the eighteenth century in England and the Netherlands had been

known for many years (even in Roman times), and farmers had merely chosen to reintroduce them because relative prices had shifted in such a way as to make it profitable once again. The same may also be true of some aspects of crop rotation, such as the increasing use of clover in England. In that sense, the changes that we see were simply a change in the choice of technique rather than technological change.

Second, England had one of the highest land–labor ratios in the world and should really have been inventing labor-saving technologies if it were responding to resource constraints in the way that Boserup suggested. But the evidence on this is very mixed. For example, attempts to introduce steam threshers in the 1820s sparked the Swing Riots, and the machines vanished in southern Britain until the 1850s (Hobsbawn and Rudé, 1968). Also, it seems likely that innovation in English plow technology was driven by local knowledge spillovers rather than local resource shortages (as signalled in the market place by the local relative prices of labor and capital) (Brunt, 2003). However, England did manage to introduce some labor-saving machinery at a relatively early date. Notably, by 1871 an estimated 25 percent of wheat in England and Wales was harvested by mechanical reapers, considerably more than in Germany (3.6 percent in 1882) or France (6.9 percent in 1882) (Collins, 1969). Some Mediterranean farmers also tested the new labor-saving equipment but rejected it in preference for the cheaper, traditional methods (Simpson, 1995; Federico, 2003).

It may be that a deeper understanding of technological change requires a more holistic view of agricultural production. Labor productivity in agriculture was greatly influenced by the ratio of draft animals to human labor. O'Brien and Keyder (1978, pp. 115–19) have suggested that English farmers had perhaps two-thirds more animal power than their French counterparts in 1800, helping to explain the differences in labor productivity.[2] The role of horsepower was crucial to increasing output both on and off the farm, and this was one of the areas where the Mediterranean region, for example, appears to have been at a major disadvantage compared with northern Europe. While the technological barrier to increasing the number of farm animals in northern Europe was the lack of winter fodder, a problem overcome with the planting of crops such as turnips, in southern Europe the seasonal shortages of feed occurred during the summer months. South of Poitou in France the possibilities of growing spring cereals were limited, cereal yields were perhaps only as much as a third of those in the north, and the long dry summers produced poor-quality grass. Irrigation was an expensive solution, and this energy

[2] Wrigley (1991, p. 329) calculates that French farm workers had about 2.1 "man-hours" of horse labor to assist him for each hour worked, compared with a figure of 3.5 hours for the English workers.

restriction remained in the Mediterranean region until the massive introduction of tractors in the second half of the twentieth century.

Urbanization, markets, and farm specialization

Adam Smith (1966, Book 3, Chapter IV) wrote that "through the greater part of Europe the commerce and manufactures of cities, instead of being the effect, have been the cause and occasion of the improvement and cultivation of the country." The concentration in cities of consumers with high incomes gave farmers a major incentive to specialize in commodities whose income elasticities of demand were higher than that of cereals. Economic historians such as Jack Fisher or Tony Wrigley in particular emphasized the role played by London. Outside England and the Netherlands (with its urbanization rate of 30 percent) the pull of the urban market was much weaker for most farmers. In 1850, on the eve of the railway age, levels of urbanization were 15 percent in France, 11 percent in Germany, 17 percent in Spain, 20 percent in Italy, and just 8 percent in Austria–Bohemia and 9 percent in Poland (de Vries, 1984, table 3.8).

A high degree of urbanization might encourage farmers to specialize, but it was the efficiency with which food could be brought from the countryside to the city which would play a major factor in determining the size of the city in the first place. Therefore if Smith could write in the 1770s that the prices of bread and butchers' meat were generally the same, or very roughly the same, throughout the greater part of Britain, this was hardly the case in some parts of Europe even a century later.

Two types of obstacle to domestic trade can be identified. First, there was the physical cost of transportation. Second, there were institutional impediments such as taxes or the need for official transport permits, or the outright prohibition of the movements of goods and (in the case of eastern Europe) people. These two features were not entirely separate. In England communications were good because of the abundance of settlements located close to navigable water, the relatively small distances, and the good flow of market information. The risk of famine was also low. On the one hand, government policy encouraged farmers to continue planting even at times of abundance, since there were effectively guaranteed minimum prices to farmers because bounties were paid on exports in times of low domestic prices. On the other hand, in times of unexpectedly small harvests (due, for example, to several consecutive seasons of bad weather), the workers' relatively high incomes attracted imports to make up the shortfall.

The English case can be contrasted with the situation in much of continental Europe. Grain marketing there was very heavily controlled, especially in the eighteenth century, with only certain places being permitted to hold grain

markets and farmers being obliged to market any surplus grain through those markets; selling outside the market was illegal and subject to very harsh legal sanctions (Persson, 1999). Transport was costly and information on the size of harvests and stocks was limited or non-existent for consumers. Rumors of shortages could set off panic buying in towns and this encouraged merchants to move grain from the countryside, where consumers had limited savings, for resale in urban markets. Yet *ancien régime* governments used a whole battery of measures to protect further urban consumers: maximum prices, restrictions on grain movements, government granaries, and so on. The urban policy bias could discourage grain planting, especially after poor harvests when price ceilings effectively expropriated the profits of farmers. Farmers might try to increase their profits by switching to other crops such as the vine, but often found that they were prohibited from doing so. Another obstacle for much of continental Europe was that goods transported and introduced into urban areas were taxed, a feature that continued well into the twentieth century in some countries.

Famine was a significant problem in early modern Europe, as can be seen by the "massive famines of the 1690s in France, Sweden and Finland, 1708–09 in France, and 1740–41 in Ireland" (Ó Gráda, 2007, p. 31). The Irish famine of 1846–52 led to an excess mortality of perhaps a million people. But by 1870, serious famine was history in most of western Europe, with a few exceptional cases such as the Netherlands or Greece in 1944–45. By contrast, wars and Stalinism led to at least three major famines in the east during the first half of the twentieth century. Research on developing economies shows that famines are not necessarily caused by an overall lack of food in an economy; instead they are caused by a maldistribution of food, either because some social classes cannot afford the food they need or because the food cannot be transported to the place where it is most needed (Sen, 1981). The same was largely true of Europe in the period from 1700 to 1870: the structure of local food markets profoundly affected how well the agricultural sector met the demands placed upon it by the wider economy.

Despite the physical and legal constraints they faced, grain merchants did their best to trade with one another when price differences were sufficient to overcome the institutional and transport costs. But how big were these inter-city prices differences and how did they change over time in response to increasing political stability and improved communication networks? These price differences provide one metric of the degree of market integration. A second metric is that of the speed of adjustment. How long does it take merchants in London to respond to a price spike in Paris by arbitraging the two market prices back down to the level of the transport cost between the two cities? Consumers and producers will both be better off, on average, if the speed of adjustment is faster.

Jacks (2005) examined grain price series for 100 cities in Europe and North America between 1800 and 1913. He found that markets in northwestern Europe – such as England and Belgium – were generally already well integrated by 1800, both within countries and between them. Price differences were low and adjustment speeds were high. Moving further south and east in Europe was associated with generally lower levels of market integration on both measures, with Austria-Hungary and Spain performing particularly badly. Jacks found considerable evidence of falling price differentials up to 1870 for all countries, but no improvement in adjustment speeds. Regression analysis of both price differentials and adjustment speeds revealed the type of economic behavior that we would expect to find: better transport links (canals, railways, ports, and river connections) resulted in smaller price differentials and higher adjustment speeds. However, it is interesting to note that Jacks (2006) shows that improvements in market integration over time were not due to improvements in transport networks; instead, they were due to improved political stability. Whilst Jacks's results are certainly interesting, Coleman (1999) argues that tests of market integration based on prices alone may be misleading, because it is difficult to distinguish between increased synchronicity of shocks and increased speed of adjustment. Brunt and Cannon (2007) address this problem by breaking down price differentials into four components: the average price differential, the variance of the price shocks, the correlation between the shocks and the two price series, and the speed of adjustment of one series to the other. They find that for England between 1770 and 1820 virtually all the deviation from the "law of one price" was due to the average price differential, rather than the adjustment speed; like Jacks, they find that the marked improvement in roads and canals over the period had very little effect.

For some regions, export markets were of particular importance. By the late eighteenth century the major trade flows in basic foodstuffs, such as grain, were from the Baltic (especially East Prussia and Poland) towards northwest Europe (especially the Netherlands, which was both a consuming center and a distribution hub). From the early nineteenth century onwards, England became the major European importer and began to draw grain additionally from Russia through the Black Sea. The total quantities shipped were nonetheless quite small compared with overall consumption; even in England in the 1850s, after the move to free trade, wheat imports amounted to only around 25 percent of total consumption. There was very little impact from trade with the New World before 1870 (O'Rourke, 1997; O'Rourke and Williamson, 1999).

Wine had been an important commodity in international trade in earlier periods, but between the mid-seventeenth and the late eighteenth centuries the production of specialized fine wines underwent major transformations that changed the patterns of trade and consumption. Port was a drink developed by British

merchants in Portugal for consumption in Britain. The development of fine wines in the Bordeaux region can be dated to the period between about 1650 and 1740, involving the draining of the Médoc and the introduction of cylindrical bottles and corks that allowed the best wines to be matured in bottles. Producers in Champagne learnt to overcome the difficulties of a second fermentation in the bottle and began to market their wine as a luxury product worldwide (Guy, 2003). The poor keeping-quality of most wines, high transaction costs, and high levels of taxation everywhere limited the possibility for European farmers to utilize labor more intensively and obtain productivity gains through market specialization in wine. Nevertheless, wines were very important export items, accounting for about half of all Portugal's exports in 1850, a quarter of Spain's, and a tenth of France's.

Institutions

The empirical findings described in the previous sections indicate significant variation in labor productivity, technological progress, and market integration across Europe in this period. Still, a broad pattern can be discerned: southern and eastern Europe lagged behind the northwestern regions – especially England and the Netherlands – in all these areas until well into the nineteenth century. How can we account for these differences? While climate, geography, and differences between cultures may well have had some effect on outcomes, the role of institutions – in particular the procedures established to uphold property rights and enforce contracts – must not be overlooked.

An institutional approach seeks to explain differences in productivity as resulting from differences in the economic, social, or legal frameworks that characterize a particular society. For instance, without secure property rights farmers – regardless of cultural beliefs or length of growing season – were unlikely to invest in agricultural innovations, since they could not be sure that the returns to such investments would accrue to them. Without a reliable system of contract enforcement, peasant farmers could not obtain credit, and thus could not undertake expensive innovations. Property rights and contract enforcement varied substantially across Europe (and within any given country) in this period. How these processes worked in any given place was largely determined by the local institutional framework – in particular, by the strength of local corporate entities, such as landlords, churches, and communities.

In England these groups were relatively weak. Instead, there was a remarkably centralized legal framework and system of courts, which developed at a very early date. Even in the medieval period, when the Church and landlords were quite powerful and had much control over their peasant tenants (serfs), an

integrated system of courts was used, even by serfs, for the resolution of property and credit disputes.[3] Not only were there manorial courts, where disputes regarding transactions among serfs were heard, there were also royal courts, to which cases could even be brought against landlords who violated customary agreements by raising rents or demanding additional labor. This legal framework was not nearly as sophisticated as that which exists today, but it nonetheless sufficiently reduced the risk involved in transactions to enable the existence of lively rural markets in land and credit, as well as grain and livestock. (English agricultural productivity was aided by later developments, such as the enclosure of open fields, which resulted in even more clearly defined property rights.)

In much of southern Europe, rights to property were less clearly defined, and improvements in agriculture were hindered by disputes between powerful local groups over control of resources. Due to uncertainty in property rights in parts of *Ancien Régime* France, landlords and villagers could often claim rights to the same lands (Rosenthal, 1992; Hoffman, 1996). While France did have a system of courts to decide such questions, this system did not function particularly well. The litigation process was slow and costly, and decisions that were granted could be appealed repeatedly. This did little to reduce uncertainty, and innovation remained a risky undertaking. The situation only improved, with greater investment in technological innovation, when a uniform system of clearly assigned property rights was introduced by the Revolution.

Agriculture in Spain, too, was affected by uncertainty in property rights. "Ownership" in Spain often had several layers, with those who had rights to the rents from land being distinguished from those who had the right to cultivate it (*dominium directum* and *dominium utile*) (Simpson, 1995). Agricultural innovations were further hindered by powerful local groups, who held special privileges from the crown. One such institution was the Mesta, a powerful association of shepherds and sheep owners on which the crown, in exchange for payment, had bestowed rights to pasture on all traditionally unsown land. While there has been some debate in recent years over the broader economic effects of Mesta privileges (Nugent and Sanchez, 1989), many historians maintain (as did contemporary observers) that the powers of the Mesta made it difficult to enclose property and delayed bringing pasture under cultivation, and thus limited the possibilities for improving agricultural production.

Landlords' powers had similarly negative effects on agricultural productivity. In some parts of Italy (such as Tuscany) landlords were able to control the way

[3] Even in a place as centralized as England there was institutional variation. Recent research on rural debt litigation in the thirteenth and fourteenth centuries suggests that manorial court procedures – and the way courts were perceived to function by local inhabitants – had a significant effect on the size and shape of local credit markets. See Briggs (2006).

in which tenants' lands were allocated and used. Many retained the right to terminate leases at will. Insecurity of tenure and the regular confiscation of surpluses made it unlikely that tenant farmers in these regions would invest in improving yields. In central and eastern Europe, landlords had even greater powers. Much of Europe east of the river Elbe was in this period still under the "second serfdom,"[4] a tenurial system in which landlords had significant control over the allocation of their tenants' labor. Serfs are often said to have been "tied to the land" because, in most serf societies, they were not free to leave their landlords' holdings. They cultivated land which they rented from their lords and for which they usually paid an annual fee in cash or kind. In addition, many serfs were obliged to spend several days a week cultivating their landlord's own land (demesne). Serfs were thus unable to allocate their full supply of labor to their own plots, and any attempt to increase productivity was undermined. And they had no incentive to use their labor efficiently on the demesne, as the benefits of their exertion accrued mainly to the landlord.

Landlords under the second serfdom engaged in various forms of rent seeking. Some held monopolies on brewing and insisted their tenants buy local beer at inflated prices. Some held monopolies on milling and insisted their tenants bring grain to the manorial mill. Most landlords extracted fees from their tenants for permission to marry or to travel beyond the estate boundaries.[5] It might be argued that serfs were often able to evade estate policies, thus minimizing their effects on productivity. However, getting round rules and regulations was also costly. Serfs often had to pay bribes to estate officials and risked fines for violating estate rules. The end result was a steady confiscation of surpluses which made it very difficult for peasant farmers to accumulate the wealth necessary to invest in improving their yields. Such rent seeking simultaneously provided a disincentive for such investments, since the returns were anyway likely to be siphoned off by landlords.

Incentives for innovation were further undermined by strong local communities. In much of central Europe, communities controlled access to land through their power to regulate transfers. For instance, in the Württemberg Black Forest, peasant farmers could not sell or bequeath holdings without the permission of the community. Village communities in this region regulated access to common resources, and were responsible for deciding how arable land would be used. Those who wished to plant new crops or adopt new technologies had to have the permission of village officials.[6] Strong local communities also existed under the second serfdom. Like the communities in Württemberg, they,

[4] "Second" because it came after medieval serfdom or "feudalism," though it is worth noting that not all places which experienced a "second" serfdom had experienced a "first."

[5] Examples of such practices can be found in Ogilvie (2001); Hagen (2002), Dennison (2006); Dennison and Ogilvie (2007).

[6] See discussion in Ogilvie (1997), esp. ch. 3; Warde (2006).

together with landlords, had the power to regulate transfers and take decisions about the use of commons and arable. In many places, serf communities had the power to take land away from households they viewed as not economically viable. On estates in Bohemia and in Prussia, for instance, widows could be forced by the community to remarry in order to retain their holdings (Ogilvie and Edwards, 2000; Hagen, 2002). In Russian serf society, where most arable was held in communal tenure, communal officials allocated land in accordance with the number of laborers and consumers in each household. When a household changed in composition, these officials had the power to reallocate some portion of its land to another, larger household.

Restrictions on mobility, enforced by both landlords and communities, affected the pace of urbanization and market integration in central and eastern Europe. In serf societies, those who paid rents in cash or kind could often get permission to engage in migrant labor in nearby towns or cities, though they were not generally permitted to migrate permanently. They were still required to fulfill certain annual obligations on the estate – or at least hire someone to fulfill them in their absence. Serfs who owed regular labor on the landlord's demesne were less likely to obtain permission to leave, even temporarily. Communities in serf societies, as well as in areas without serfdom, often had a say in whether their members were allowed to travel, as well as in whether new householders could settle in the village. Many landlords required that a serf obtain the permission of the community before he or she would agree to issue travel documents. Not surprisingly, then, this region urbanized much more slowly. Even at the beginning of the nineteenth century, there were no cities as big as London or Paris in central or eastern Europe.

Conclusion

It is no coincidence that those places where agricultural productivity improved first were also the first to industrialize. For industrialization to occur, it had to be possible to produce more food with fewer people. England was able to do this because markets tended to be more efficient, and incentives for farmers to increase output were strong. As labor flowed to the cities, agricultural output and imports of food and raw materials increased. By 1840, labor productivity in agriculture was as high as that of the rest of the economy (Crafts, 1985a).

Why did other countries, especially those in eastern and southern Europe, take longer to increase farm output and productivity? Natural resource endowments were clearly different from those of northwest Europe, which perhaps made it harder to develop and introduce new farming techniques and commercial crops. However, a greater obstacle would appear to have been the fact

that there were fewer incentives for farmers to change production systems, either because they faced major difficulties in reaching potential consumers, or because institutional arrangements failed to overcome problems of market failure.

When new techniques, crop rotations, or the reorganization of land ownership were rejected, it was not necessarily because economic agents were averse to change, but because the traditional systems were considered more profitable by those with vested interests. Agricultural productivity in southern and eastern Europe may have been low, but the large landowners were often exceedingly rich, and were successful in maintaining policies which favored the current production systems. In Britain, the abolition of the Corn Laws and the collapse in domestic cereal prices, especially after 1873, not only seriously challenged the economic and political base of the country's aristocracy and landowning classes, but also increased urban real wages, thereby providing new opportunities for other forms of farming, such as labor-intensive market gardening. Outside northwest Europe, changes did take place between 1700 and 1870, but tended to be more localized. Only in the twentieth century did parts of southern and eastern Europe begin to achieve productivity levels found in the northwest in the late nineteenth century.